

1. INTRODUCTION

X.25 is the standard interface between data terminal equipment (DTE) and packet switching equipment (DCE). It can also be used for DTE to DTE communications. The X.25 Recommendation was formulated by the International Telegraph and Telephone Consultative Committee of the United Nations (CCITT) and introduced in 1976, with revisions in 1980 and 1984. It provides a highly reliable and efficient method of transferring data from different locations. A single X.25 interface can carry traffic intended for many different destinations. The data is interleaved as packets, each of which is uniquely marked so the data is relayed to the proper destination.

A packet assembler/disassembler (PAD) converts equipment which uses some other communications protocol to X.25. PADs usually perform a concentrating or multiplexing function as well. The CCITT defined a PAD for asynchronous (start/stop) terminals in Recommendations X.3, X.28 and X.29. X.3 defines a set of 18 or 22 parameters which govern the operation of the PAD with respect to each asynchronous terminal port. X.28 defines the interface between the asynchronous terminal and the PAD. X.28 also defines the set of commands or responses which the terminal operator uses to communicate directly with the PAD. X.29 defines the formats of the "supervisory" packets by which the PAD or host at the distant end can signal information to each other.

DPD 8 is a packet assembler/disassembler (PAD) providing an interface between asynchronous (start/stop) ASCII devices and equipment which supports the X.25 synchronous interface. DPD 8 conforms to all applicable international standards including X.25, X.3, X.28 and X.29. It is available with either four/eight async ports, one trunk port and one virtual configuration port.

DPD 8 units can connect to public data networks and can be used as components of private data networks, providing the end-point connections for asynchronous terminals.

DPD 8 supports the X.121 addressing scheme used by public data networks. The individual async and diagnostic ports can be addressed with the sub-address digits.

DPD 8 has been designed to be compatible with the USA, CANADIAN and EUROPEAN packet-switched networks. Contact your local distributor for more information.

DPD 8 adheres to the X.3/X.28/X.29 standards for communicating with asynchronous terminals and other PADs. Additional configuration support is provided for the proper operation of ports with many types of modems; terminals with various flow control schemes, printer delay characteristics, and type font distinctions and many types of host computers and front-end processors.

The ports can be configured for autospeed and autoparity options, can both place and accept calls and can be configured to automatically establish a connection to the matching port at the other end of the trunk when data set signals are raised. The ports can operate at speeds up to 19200 baud.

The DPD 8 X.25 trunk has been configured to operate the LAPB with HDLC framing variation of the X.25 interface, with trunk speeds up to 19200 baud.

Problems can be diagnosed and configurations changed from remote points by placing calls across the network to the DPD 8 Configuration Port. This port is password protected to prevent unauthorised access. Through the Configuration Port the status of connections can be observed.

Configuration parameters are stored in battery backed memory and the operating software is in read-only memory (ROM). In the case of a power interruption, DPD 8 will be ready and operational immediately after power is restored.

In all cases, configuration parameters will be protected throughout a power fail by the battery. This battery is capable of supporting the DPD 8 configuration parameters for several months without mains power.

2. SYSTEM DESCRIPTION

The DPD 8 assembles and disassembles packets of data for four or eight asynchronous ports and one X.25 synchronous link.

The DPD 8 consists of either one or two printed circuit boards (PCB) depending on whether four or eight async ports are required.

The two boards are:—

- DPD 8 PCB with 4 ports and 1 trunk.
- DPD 8 4 port async expansion board.

The DPD 8 4 port expansion board connects to the main DPD 8 PCB via a 64 way AB connector and consists of I/O ports and circuitry to support four asynchronous ports.

This expansion board must be used in conjunction with the DPD 8 main board. It will not function as a stand alone unit.

Switch SW2 on the main board selects the async port default options. This switch is described in Appendix A. A DTE/DCE programming plug on the P.C. board selects the pins on which the RS-232-C signals will be sent and received. An asynchronous port can be configured as a DTE or as a DCE (to emulate a modem) for direct terminal or host computer connections. System and port configuration information is stored in the battery backed RAM, and is protected from power failure. This configuration information can be altered at any time through a virtual configuration port reachable from the local asynchronous port or across the X.25 trunk. Other associated hardware configuration links are described in Appendix A.

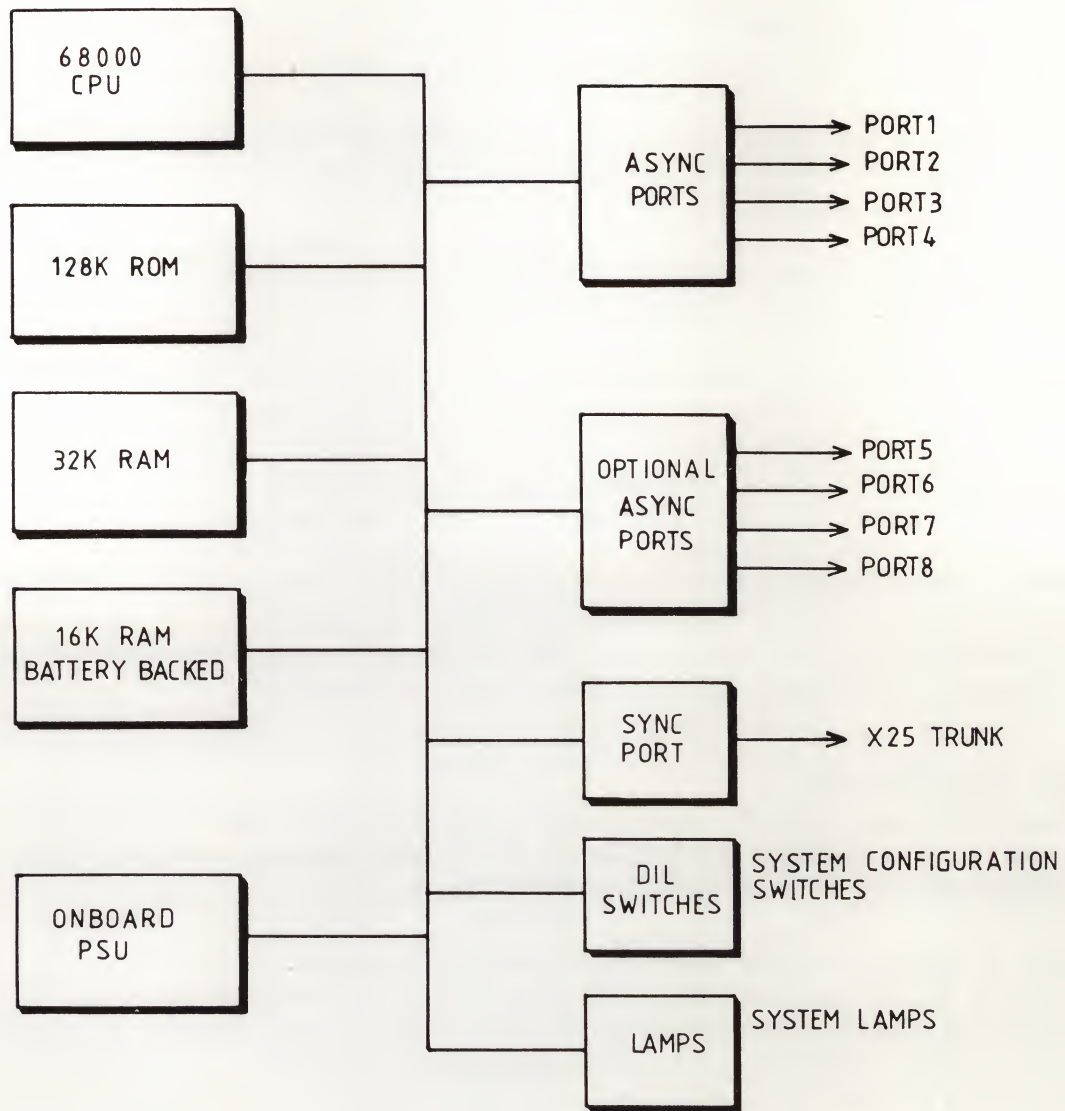
2.1 The X.25 Link

The DPD 8 uses the X.25 trunk located on the main PCB. This trunk supports speeds up to 19200 bits per second (BPS) with external or internal clock configurable by links on the PCB. (Refer Appendix A).

DPD 8 operates on the LAPB (Link access procedure balanced) variation of the X.25 link protocol using HDLC framing. Link level addressing for DTE or DCE is switch selectable via SW1. At the packet level, support for public data network variations and other networks is available via system configuration options.

2.1.1 Virtual Circuits

A virtual circuit is the logical connection between a source port and a destination port. When a terminal is connected to a DPD 8 port, a circuit can be established either automatically or manually from its port to the destination port by picking an unused logical channel number and transferring a Call Request packet specifying that logical channel number. The Call Request packet identifies the calling port and the destination port and can carry other information which will be used to set up the logical connection. The logical channel number is nothing more than a number carried in the Call Request packet. When the destination accepts the call, it agrees to use this number to identify all data pertaining to this port. When the



DPD 8 HARDWARE BLOCK DIAGRAM

logical connection is terminated, this number is freed for a subsequent connection. This logical connection is referred to as a connection or a call. DPD 8 ports can place as well as receive calls.

2.1.2 Packets

Data received from connected terminals is collected into packets (blocks of data) and transmitted across the trunk to the distant end. DPD 8 prefixes the data in the packet, which can contain input from only one terminal, with information which includes the logical channel number. Packets received with the same logical channel number are recognised by DPD 8 as containing data sent from the destination port and are delivered to the terminal. DPD 8 can operate with either 128 or 256 packet size defined by the configuration port.

Data is collected from the port into a packet until one of the following conditions arises, at which time it is transmitted to the destination:

The 129th/257th character is received.

A forwarding character is received. (Forwarding characters are defined by parameter 3; see Appendix B). The forwarding character will normally be the last character in the packet.

No characters are received for a period of time. (This period of time is defined by parameter 4; see Appendix B). However, empty packets are never transmitted.

The Break key is pressed. (However, if parameter 7 is set to zero — do nothing on Break — the packet will not be transmitted).

The Recall character and an additional character, other than the recall character, Cr, +, SP or DEL is received. (See parameter 1 in Appendix B. The Recall character is used to escape from data transfer mode to communicate directly with the Pad. Parameter 1 can be set so there is no Recall character).

DPD 8 always has a dynamic buffer attached to each port collecting data. At times, DPD 8 may not be able to supply a new buffer when the current one must be transmitted. Reasons for not having a new packet ready have to do with the window blocking which is described in the next section. In order to minimise loss of data under this condition, DPD 8 will attempt to flow control the terminal using XON/XOFF as defined by parameter 5, see Appendix B. If a buffer fills and DPD 8 cannot flow control, the arriving characters will be discarded.

2.1.3 Data Acknowledgement and Window Sizes

At the link level, up to seven information frames may be outstanding (unacknowledged) before DPD 8 must wait for acknowledgement. "Window size" is a term for describing this maximum number of unacknowledged frames (or packets when referring to the packet level).

The receiver can eventually stop the transmitter from transmitting by refusing to acknowledge. The transmitter will be forced to stop when it reaches the "window edge". This is known as "blocking" the window and is a form of X.25 flow control. The other form of X.25 flow control is for the receiver to transmit a Receive Not Ready (RNR) frame.

At the packet level, a similar flow control mechanism exists for the individual logical channel set up between a local port and a port at the destination. Unless otherwise specified, the window size for each logical channel is two. DPD 8 can be asked to negotiate the window size to any value up to seven when a logical channel is set up. However, the network you are connected to may limit the window size value. DPD 8 uses the passive window blocking technique of flow control but will also act on RNR packets received from non-Dynatech Communication equipment.

DPD 8 is governed by the window size with respect to the number of packets it can transmit across the trunk before it must receive acknowledgment. However, it banks up additional packets internally up to a maximum of 7 packets per asynchronous channel. When this limit is reached characters continue to be held in an internal 256 byte buffer, one per terminal, and when this becomes nearly full an XOFF character is sent to the terminal assuming that parameter 5 (see appendix B) allows it.

2.2 Asynchronous Ports

The DPD 8 has either 4 or 8 asynchronous ports. X.3 parameters are individually available to the terminal operator or the host computer at the distant end. Terminal user commands for manipulating these parameters are described in Appendix D. Commands which X.25 host computers can use to change these parameters are called X.29 commands. Defaults can be permanently changed via configuration port commands described in Appendix F.

The port can be set for speed and parity or it can be set for autospeed/autoparity detection whence successive carriage returns determine the speed and parity of the terminal. Autobaud works from 300 to 19200 baud. The following speeds are supported:

300 baud	4800 baud
600 baud	9600 baud
1200 baud	19200 baud
2400 baud	

DPD 8 supplies one stop bit after each character at all speeds.

Most eight bit (seven-level plus parity) terminals (ASCII) are supported. DPD 8 messages are sent in ASCII upper case in order to support both ASCII and APL-ASCII terminals. Eight bit characters of any code are supported transparently. The six and seven bit codes are not supported.

DPD 8 accepts characters with the configured parity. Inbound data is normally placed in the packets with the parity bit set to zero, unless set for transparent. Outbound parity can be selected as even or odd mark or space or 8 bit transparent. Refer to parameter 21 in Appendix B for more details. Data from incoming packets, messages from DPD 8, and echoed characters will be sent to the terminal in the selected parity. The Autoparity feature can also be selected. With Autoparity, the parity of the first character received from the terminal will determine the parity of the characters sent to the terminal. If transparent parity (parameter 21=0) is selected, the data in packets will be retransmitted without tampering with parity, messages from DPD have even parity and echo is an exact copy of the data sent.

Certain block-mode terminals which respond to flow control can be supported by using bigger than default window sizes. Terminals which dump a screen full of data at a time, typically 1920 characters, will require 15 packets. With a window size of seven, seven packets can be in transit and seven stored locally. These plus the extra buffer bring the total to the required 15. This is a worst case calculation since initial packets should be unloading at the distant end while subsequent ones are being loaded locally.

A programming plug on each port selects DTE or DCE signal presentation on the RS-232-C (V.24) interface. As a DTE, the port can be connected to a dial-in modem or limited distance adaptor. As a DCE, the port emulates a modem so terminals and host computer ports can be directly connected without special cables.

X-ON/X-OFF flow control is independently optional in either direction via X.3 parameters. DPD 8 will stop transmitting within two character times of receiving a flow-off signal. Terminals can typically transmit over 30 characters more after receiving a flow-off signal from DPD 8.

In auto-connect mode, the raising of data set signals or a (CR) character causes a virtual circuit to be automatically set up to the destination. Otherwise the user must enter digits or mnemonics to determine the destination of the connection.

A rotary (hunt) feature is provided for host concentrator support. Incoming connections are assigned to the next available port which has DTR up, or failing this, to a port without DTR up.

Via the configuration port, a technician at a central site can set up the port parameters either locally or remotely.

2.3 Terminal Control Parameters

Each terminal make and model has idiosyncracies which must be taken into account. DPD 8 can be completely transparent, allowing the host computer to do the terminal support. It also can take over many of these support functions which cater for operating variations among terminals, freeing the computer to devote more of its time to computing, and can reduce the overhead on the communications link up to fifty percent by taking over "full duplex" echoing formerly done by the computer or front-end processor. Printing terminals which are not supported by a particular computer or application program can be used if DPD 8 is set up to provide the appropriate delay to allow for mechanical function.

DPD 8 has 21 different X.3 parameters which can be used to optimise support for a wide variety of equipment. These parameters are defined in the X.3 standard. Via these parameters, DPD 8 can provide the following services:

Return to command mode for the resetting of parameters, attaching printers or terminating calls.

→ Echoing of typed characters.

→ Selection of packet forwarding characters and timer values.

Flow control schemes.

Suppression of Pad messages.

Action on receipt of Break.

Padding for printers requiring delays for mechanical movement.

Line folding for automatic carriage return on oversize lines.

Line feed insertion after carriage return.

Local editing (backspacing for corrections, line cancellations).

These parameters can be manipulated in a variety of ways. They can be changed by the host computer with or without the knowledge of the terminal user or they can be changed by the terminal operator before or during a session. Terminal profiles can be set up for the different types of terminals used by the customer's organisation; when a user connects to DPD 8, he or she types in the standard X.28 PROF command to select the profile which matches the terminal being used. Finally, default profiles can be assigned on a port by port basis, to customise it for particular terminals.

2.3.1 Escaping to DPD 8 Command Mode

Terminals connected to DPD 8 can be in one of two modes. In data transfer mode, characters typed in are delivered to the destination. DPD 8 command mode, characters typed in are interpreted as commands to the local Pad. Unless auto-connect is used, terminal sessions begin in PAD command mode. When the selection command is typed in and the destination accepts the connection, the terminal shifts to data transfer mode. DPD 8 can be configured to prevent the return to PAD command until the connection is taken down by the destination.

Escape to command mode can also be accomplished by pressing the Break key or typing a special character such as Control-P (DLE). See parameters 7 and 1 in Appendix B. If the Break key is chosen for this purpose, Break cannot be signalled to the destination. Return to data transfer is automatic at the end of a command.

2.3.2 Echoing of Typed Characters

Terminals are often configured so that they do not print or display what is typed but wait for it to be echoed by the computer. This is called Echoplex or, erroneously, full duplex. DPD 8 can be configured to provide this by character echoing. See parameter 2 in Appendix B. This will provide crisper response and better utilise the communications lines and host computer. The echomask (parameter 20) can be set to exclude certain characters from echo.

2.3.3 Packet Forwarding Conditions

Section 2.1.2 describes the concept of packets and packet forwarding conditions on character input.

2.3.4 Packet Forwarding Timer

If packets are to be forwarded only upon the expiration of a timer, parameter 4 can be set to values from 1 to 255 which are increments of one-twentieth of a second. When this parameter is non-zero, a packet will be forwarded only if the data arriving at a port stops for a length of time greater than the value chosen. Refer to Appendix B. }

2.3.5 Flow Control Schemes

DPD 8 and its connected networks guarantee the correct delivery of data or they will inform of failure. This is done by detecting errors in transmission and retransmitting until the data is received correctly. These retransmissions may cause delays, as can the sharing of transmission links by many users, overloaded equipment, and delays in the acceptance of data by the destination.

DPD 8 packet buffering (Section 2.1.2) minimises the possibility of loss of data from terminals, especially character by character terminals which can be caused by packets backing up due to delays. However, block mode terminals and computer ports should be prepared to temporarily halt transmission when signalled by DPD 8 that packets are backing up. This signalling is called flow control.

With parameter 5, DPD 8 can be configured to transmit a character (DC3 or X-OFF) when it wants to halt reception. It will then transmit another character (DC1 or X-ON) to signal that more data can be safely received. Section 2.1.3 describes instances when flow control is applied.

The terminal or host computer port may likewise have reason to control the flow of characters from the DPD 8. X-OFF/X-ON flow control is available via parameter 12. }

2.3.6 Suppression of DPD 8 Messages

Parameter 6 is used to allow or suppress messages issued by DPD 8. It also suppresses responses to many commands. It is used in connecting to computer ports which would not know what to do with DPD 8 messages and in any application where such informational messages are neither desired nor required. } !

2.3.7 The Break Key

DPD 8 can respond several ways when the Break key is pressed:

It can take no action;

It can send a Reset packet;

It can cause an escape to command mode, which is described in Section 2.3.1;

It can flush incoming data and notify the destination that the Break key had been pressed.

Use parameter 7 to select the action to be taken.

Flushing imitates a popular use of the Break key — the immediate cessation of output.

Computers so configured will immediately stop output on receipt of Break or a Break equivalent. A problem arises with the number of packets in transit. Point-to-point is not so bad, but connections across networks can bank up a lot of packets. A slow terminal can take a long time to deliver them all and no amount of banging on the Break key will help to stop it sooner.

When configured for flushing, DPD 8 ceases output as soon as the Break key is pressed by setting its parameter 8 to discard output. It notifies the destination it has done this by transmitting an Indication of Break X.29 packet as well as the Interrupt packet. Data in arriving packets is discarded as rapidly as it arrives.

Upon receipt of the Indication of Break, the properly configured destination will immediately respond with a Set X.29 packet setting parameter 8 back to zero to allow output. This packet will travel behind the unwanted data and will allow output again when it is finally received. Wanted output (such as the computer prompt engendered by the Break) follows the Set packet and will be delivered to the terminal.

2.3.8 Mechanical Delay Support

Certain printing terminals require delays after carriage returns and/or line feeds to allow for the movement of the print head back to the margin or to the next line. Many now buffer the incoming characters and use flow control (see Section 2.3.5) if they get behind. Others are not so sophisticated and need time delays to allow for the mechanical movement. The destination can worry about this or DPD 8 can be configured to introduce null characters to effect this delay. See parameters 9 and 14 in Appendix B.

2.3.9 Output Width Adjustment

DPD 8 can be configured so that output can fit on printers with narrower carriages or CRT's with smaller screens than that for which it was intended. Once the required width is set up via parameter 10, any lines exceeding the width will be folded onto the next line by the insertion of a carriage return and a line feed.

2.3.10 Line Feed Insertion

In most cases, carriage returns are followed by line feeds because the desired function is to position the carriage or cursor at the beginning of a new line. DPD 8 can be configured to insert the line feed under various conditions by using parameter 13.

2.3.11 Local Editing

Since DPD 8 stores characters in packets prior to transmission, manipulation of those characters, especially to correct mis-types, is desirable. Local editing is turned on and off with parameter 15. Parameter 16 defines the character, usually Delete (Rubout) or Backspace, which will erase the preceding character. Parameter 19 can be set to give a suitable echo of the character and line delete characters suitable for either display or printing

terminals. Parameter 17 defines the character, usually Control-X or Cancel, which will delete the entire line, and parameter 18 defines the character, usually Control-R, which will cause the current line to be re-displayed. Any of these three functions can be displayed independently of the others.

When editing is on, parameter 4, which causes packets to be forwarded when nothing is typed for a period of time, is disabled. Likewise, packets will not be automatically forwarded when the packet is full. The only forwarding condition is a data forwarding character selected by parameter 3 (usually carriage return). If you type more than 128/256 characters without pressing Return, DPD 8 will simply discard the extra characters.

2.3.12 PAD Profiles

The standard CCITT profiles are not very suitable for use with a visual display unit, and in view of this the following may be helpful in establishing a more useful set of parameters.

a. Ancillary Device Control — Parameter 5

The X.28 specification states that if parameter 5 is set to 1, an X-OFF will be generated when the pad leaves data transfer state (for example when control-P is typed or a clear packet is received). This is intended to stop an ancillary device connected to the terminal, but with a vdu it often has the unfortunate effect of preventing the terminal from generating output.

The best way around the problem is to set parameter 5 to 2 or, if one has a terminal not likely to overrun the pad, to 0.

b. Parity Generation — Parameter 21

The X.28 specification states that if parameter 21 does not allow parity generation then all service signals will be generated with even parity and data will be output exactly as it appears in the packet (all eight bits). This may cause confusion, and if "transparent" operation is not required, the safest thing to do is to set parameter 21 to 2 and ensure that the parity setting at configuration is not transparent. Setting parameter 21 to 2 ensures that all output has the same parity.

} 8-bits

c. Echo and Editing

The editing service signals (character delete, line delete and line display) are normally echoed to the terminal and, as they are usually control characters, terminal operation may be affected. It is probably best to prevent their output by an appropriate setting of the echo mask (parameter 20 should include the value 64).

Parameter 19 is best set to 2 with a vdu. This ensures that line delete removes the line from the display instead of merely generating "XXX". Also character delete erases the character from the display instead of generating '/' whatever the setting of parameter 16 (character delete). If parameter 20 is set as above, parameter 16 may safely be set to backspace, and character delete will be done by the pad rather than by the echo of backspace.

Note that unless parameters 5 and 12 are both set to zero, X-ON and X-OFF will never be echoed to the terminal.

2.4 Standard User Selectable Features

The following are user selectable features of DPD 8. Refer to the indicated sections for more information.

- Logical channel window size assignment
- Invitation to Clear
- Remote Logon
- Single Rotary Feature
- Refuse reverse charge (collect) calls
- Logical group number assignment
- Logical channel number range assignment
- Calling address
- Additional statistics
- Remote connect configuration port
- Local connect configuration port
- COM calling addresses
- Configuration port password protect
- M-bit support
- Datapac support
- Link output baud rate
- Link window
- T1 timer

Optional special features can be introduced as extra charge items specified by the customer when DPD 8 is ordered.

There are three top level menus available locally via the "config" command and remotely via calls to subaddress 9. The following sections describe the options available with each menu, and Appendix F contains further configuration information.

2.4.1 Port Configuration

2.4.1.1 Invitation to Clear

Invitation to Clear corrects the effect of potential data loss. With this feature enabled, instead of sending a Clear Request packet DPD 8 sends a special data packet (Q-bit packet), an X.29 Invitation to Clear message. The call is not taken down. When the destination receives the Invitation to Clear, it will make sure data prints out. It then sends a Clear Request packet to end the session.

If the destination equipment is Dynatech equipment, it will respond correctly to an Invitation to Clear. Other equipment may or not pay attention to Invitation to Clear. On public data networks many different kinds of equipment are used, so before enabling Invitation to Clear, be sure all your calling user's equipment supports Invitation to Clear.

If the calling equipment does not support Invitation to Clear, the circuit will never be cleared and the port will remain tied up and unable to receive any more calls until the calling equipment or the network finally clears the circuit, something which may never happen.

See the configuration port in Appendix F for detailed information.

2.4.1.2 Hunt Group

The hunt group is a group of ports which can be reached by using the same address. Operationally, this means that if a call is received for a certain port which is in use, the call will be connected to the next available port in that group. An incoming call with a subaddress ending in 0 will select the hunt group and the port.

2.4.1.3 Refuse Reverse Charge (Collect) Calls

Many networks can indicate in the incoming Call packet whether the charges for the call are to be paid by the calling or the called party. DPD 8 can be optioned to refuse reverse charge calls on a port. Otherwise DPD 8 accepts all calls, prepaid or reverse charge. Refer to Appendix F for details.

2.4.1.4 Profiles

With this command one may set up as many as eight x3 profiles as alternatives to the CCITT standard profile selected at cold start. The eight profiles may be produced by editing existing ones and any port may have one of the eight, or the CCITT standard profile, assigned as it's default.

2.4.1.5 M-bit Support

Normally DPD 8 does not supply the M-bit on full packets. When the 128th/256th character is received, the full packet is dispatched. However, when the MORE system feature is enabled, the reception of the 129th/257th character will cause a 128/256 character packet to be sent with the More bit set to indicate that it is part of a sequence of packets. The last packet of such a group will be forwarded either upon the expiration of the idle timer or the receipt of a packet forwarding character, depending on the settings of parameters 3 and 4. }

2.4.1.6 Baud Rate and Parity

The ports on DPD 8 can be individually configured to automatically detect the speed and/or the parity of a terminal at connection time. The speeds 300, 600, 1200, 2400, 4800, 9600 and 19200 bps can be detected automatically when a terminal operator successively presses carriage return. The parity of the terminal's data can also be automatically selected at this time.

2.4.1.7 Set Format String

When using the Dynapad for status and configuration in the local mode with a display terminal, a more attractive display may be produced with an optional format string. The character string entered should move the cursor to the home position (top left) and erase the display. If the terminal cannot do this operation it does not prevent status display or configuration, it is only a convenience feature.

2.4.1.8 Change Port

This command enables one to select a different port for configuration without first returning to the top level menu.

2.4.1.9 Configure Autocall

The normal way of originating a call from a port is by explicitly giving the address in an X.28 selection command or by means of a mnemonic with the Dynapad "CALL" command. Autocall provides a third alternative. If the autocall feature is appropriately set up, the port will automatically call a preset address as soon as the data set signal DTR appears or alternatively when ever the user types CR. Even if neither of these two options has been selected, it is still possible to call a configured autocall address merely by typing "CALL" with no mnemonic given. All autocall modes support several optional facilities and an optional call user data field.

2.4.1.10 Initialise Port

After setting the port configuration it does not come into effect until the initialise port command is given. It is unwise to give this command if a user on the port has a call up as he may well lose the call.

2.4.2 System Configuration

2.4.2.1 Logon Banner (Herald)

DPD 8 can greet terminal users with your company name or network name whenever they dial into a DPD 8 port or power up their directly connected terminals. Any size, up to 128 characters, is allowed.

The banner may be suppressed on a port by port basis by the use of X.3 parameter 6. See Appendix B.

2.4.2.2 Expanded Messages Option

Appendix D describes the messages DPD 8 may print out on user terminals. Standard messages are the terse X.28 defined messages. As an option, more descriptive messages similar to those displayed on USA and Canadian network PADs can be selected.

2.4.2.3 Logical Group Number (LCN)

1-4
X.25 networks outside of the United States can be particular about the logical channel numbers (LCN) on which DPD 8 places calls. In Canada the concern is cost, since Datapac charges for each LCN it makes available. In the United Kingdom, PSS divides the 12 bit logical channel number into a 4 bit logical group number (LGN) and an 8 bit LCN. They have assigned LGN 4 and 5 for the class of service DPD 8 provides. Other networks may require other variations.

DPD 8 allows the LGN and the range of LCNs used to be specified via the configuration port. The default LGN will always be zero, and the range of LCNs will be one to four for a 4 port unit, and one to eight for an 8 port unit.

2.4.2.4 Local (Calling) Address

10800001
DPD 8 can provide its own number (calling address) in all Call Request packets. This is not normally necessary when connected to a public data network as inserting this address is the responsibility of the network. When

connected to a private network or directly to a computer or front-end processor, knowing where a call came from is desirable. A unique calling address will provide this information automatically.

Unless the Datapac option is enabled, the port number of the port originating any outgoing call will be appended as a two digit number to the local address. The appended digits will be in the range 01 to 04 for the 4 port pad and in the range 01 to 08 for the eight port. If the local address entered is longer than 13 digits, it will be truncated to 13 digits when the call is made in order to make room for the port digits.

Disabled
↓

2.4.2.5 Datapac Network Support

Datapac network addresses are limited to eight digits and do not allow a sub-addressing capability. When the DATAPAC option is on, the last two digits of the Call User Data field rather than the last digits of the X.121 Called DTE Address Field select the port.

Note: DPD 8 supports many other networks not specifically listed above, mainly because these networks adhere to the CCITT specified X.25, X.3 and X.29, with little or no exception. Certification, type approval, or permission to connect have been received from most North American and European networks. Contact Dynatech Communications or your distributor to inquire whether DPD 8 is compatible with the network you intend to use. Because of international gateways which cater to the idiosyncracies of differing networks, DPD 8 can place and receive international calls from most foreign countries' public data networks without any configuration changes on your part, once you have configured it for your local network.

2.4.2.6 Mnemonic Addressing

DPD 8 can be configured so that users need only type in a one to four character mnemonic in order to reach a desired destination. DPD 8 makes the association between the mnemonic and the actual network address number and provides the correct number in the Call Request packet toward the network switch. In addition to the called address, facilities for each call, including user data field, can be entered.

Up to 40 different mnemonics can be entered.

2.4.2.7 Packet Window

As supplied DPD 8 will use a packet window of two for outgoing calls without any additional specification given in the selection command, mnemonic call or autocal. This system wide default of two is the CCITT recommended default, but it may be changed with this command.

128
↓

2.4.2.8 Packet Size

As supplied DPD 8 will accept packets of 128 bytes of data and send link error (FRMR) frames if it is sent longer ones. Similarly the largest packets it will transmit will also be 128 bytes. This is the CCITT standard recommendation but some networks require 256 byte packets and this option enables the receive and transmit packets to be so modified.

2.4.2.9 Clear and Clear Confirm Options

Whenever DPD receives a clear packet it usually prints out additional information on the cause of the clear. This option enables such additional information to be suppressed.

2.4.2.10 Password

The configuration process is password protected both in local and remote operation. The standard password may be changed from the supplied one (DYN68.25) with this command. Note that if the password is changed and subsequently forgotten the only way into the configuration port is by a cold start of the PAD to reset the password to DYN68.25. Such an operation will erase all other customer configured parameters.

2.4.3 Trunk Configuration

2.4.3.1 Reset Link Level Statistics

DPD 8 keeps count of damaged frames received (FCS errors) and protocol violations (received and transmitted FRMR frames) and provides a good indication of transmitted frames which were received in damaged condition by the distant equipment (received and transmitted REJ frames). X.25 automatically causes damaged frames to be retransmitted until finally received correctly. These counters can be used to judge trunk line quality when examined over a period of time. Protocol violations are normally corrected automatically, usually with no loss of data. They should not occur, however, and should be reported to the manufacturer of the malfunctioning equipment. A command is provided to reset the counters to zero.

2.4.3.2 Output Baud Rate

DPD 8 normally expects to be provided with trunk clocks from the DCE to which it is connected. Links on the main board and a special cable enable DPD to output clocks and this parameter allows the baud rate of output clocks to be set.

2.4.3.3 T1 Timer

This command allows the value of the link level T1 timer to be set.

2.4.3.4 N2 Retry

This command allows the value of the N2 link level retry counter to be set.

2.4.3.5 Link Window

This command allows the value of the link level window to be changed. The standard value of seven should suffice for most networks.

3. SWITCHING

DPD 8 can be a component of a packet-switched network. This section describes the different types of switching which DPD 8 can perform or can signal other equipment to perform. Just as with the telephone, digits are used to signal the desired destination.

3.1 Auto-connect Mode

In auto-connect mode, DPD 8 automatically places a call to a pre-determined number elsewhere on the network when the data set signals at the local end are raised or triggered by receipt of a (CR) character. Each port can call the same or a different pre-determined number. These numbers are stored in the DPD 8 memory via the configuration port. See Appendix F.

Auto-connect mode can also be used with DPD 8 as a terminal concentrator for a computer or front-end processor. A call will be established when a directly-connected terminal powers up or when a dial-in modem answers a call.

When not in auto-connect mode, the terminal operator must type in a sequence of digits or characters to place a call. The digits and characters are governed by the network to which DPD 8 is connected.

3.2 PAD to PAD Switching

When two DPD 8's are connected back to back, connections to ports on the remote unit are accomplished simply by typing in the port number, which will be a number from one to eight. Typing in the numeral 0 will select the next available port of the hunt group. Typing 9 selects the configuration port.

4. DIAGNOSTIC FEATURES

DPD 8 contains various diagnostic features to provide local visual indication and remote terminal indication of the fact that there are problems or that all is well.

4.1 Port Lamps

There are 4/8 PORT lamps on DPD 8, one corresponding to each port on the unit. When a terminal is present (DTR is high) or a modem port is in use (DCD is high), the lamp will be lit. In addition a second lamp is assigned to each port and is lit whenever a CALL is active. Separate indicators of power and trunk operational in data transfer state are also provided.

4.2 Diagnostic Port

DPD 8's configuration port can be reached from a terminal connected to the async port or from a distant terminal across the trunk. It is protected by password from unauthorised use. Once connected to the port, you can:

- check the status of the trunk;
- check the status of the terminal port;
- check overall system status;
- change configurations;
- check trunk error status;
- check port utilisation;
- change the password;
- restart the unit as if from power up;

and much more. Complete details are in Appendix F.

4.3 Help Facility

Once a user is logged on to a terminal port, a help facility is available to remind the user of how to operate the PAD. Refer to Appendix D for more details.

4.4 Test Switch

In order to diagnose terminal interface problems a special TEST switch is provided. Depression of this switch causes a standard text message;

"THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG"

to be transmitted to all ports simultaneously irrespective of the state of any calls that may be active. This test message will not affect an active call in any way should a call be active at the time the message is generated.

CONFIGURATION SWITCHES AND LINKS

The DPD 8 has system switches, port default switches and hardware links which configure to PAD for proper operation. The diagrams in this appendix show their location on the main printed circuit board, and give details of their function.

SW1 Trunk Port Configuration

	off open	on closed	
NORMAL	0	1	0
NORMAL	0	2	0
→ DTE	0	3	0
NORMAL	0	4	0
NORMAL	0	5	0
TX DISC	0	6	0
NORMAL	0	7	0
	0	8	0

DIAGNOSTICS ONLY

DCE

DATEX-P

FORCE P BIT

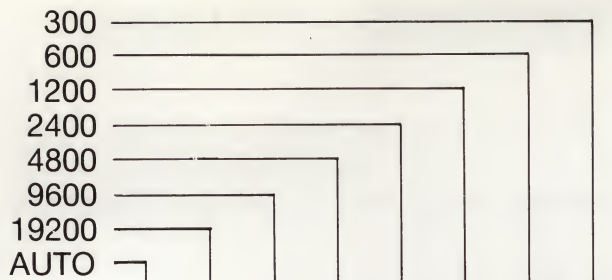
TX SABM * (See Note 1)

POLL AT T1 WHEN A DCE

NOT USED

* Note 1. Unsolicited DM response in disc sent state.

SW2 Asynchronous Ports Default Configuration



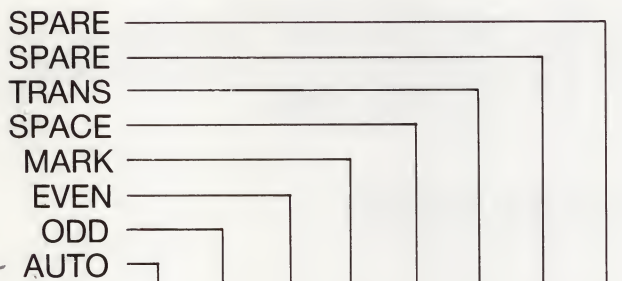
Note: OP = Open
CL = Closed

off on
open closed

OP CL OP CL OP CL OP CL
OP OP CL CL OP OP CL CL
OP OP OP OP CL CL CL CL

0	1	0
0	2	0
0	3	0

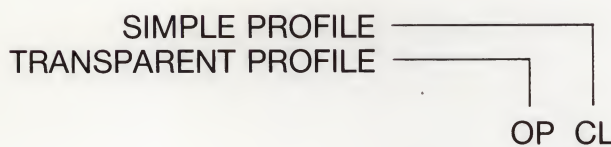
BAUD
RATE



OP CL OP CL OP CL OP CL
OP OP CL CL OP OP CL CL
OP OP OP OP CL CL CL CL

0	4	0
0	5	0
0	6	0

PARITY



0	7	0
---	---	---

PROFILE
(refer
overleaf
for
details)

0	8	0
---	---	---

NOT USED

Note: Please note that this DIL switch is only read when the unit performs a COLD START. The current switch settings are displayed in the System Status display, refer appendix D for more details.

Hardware Configuration Links

The main printed circuit board has several user definable hardware links, reference to the link location chart attached may be useful for their location. The factory default positions are marked with an asterisk, but certain applications may require these links to be moved.

LINK	FUNCTION	POSITION	DEFAULT
LK3	BATTERY BACKED MEMORY	AB BATTERY SUPPORT BC ISOLATE	*
LK4 LK5	EPROM SIZE	LK4 LK5 AB AB 27512 AB BC 27256 BC BC 27128	*
LK6-9	TRUNK PORT CLOCK SOURCE	AB EXT CLOCK BC INT CLOCK	*

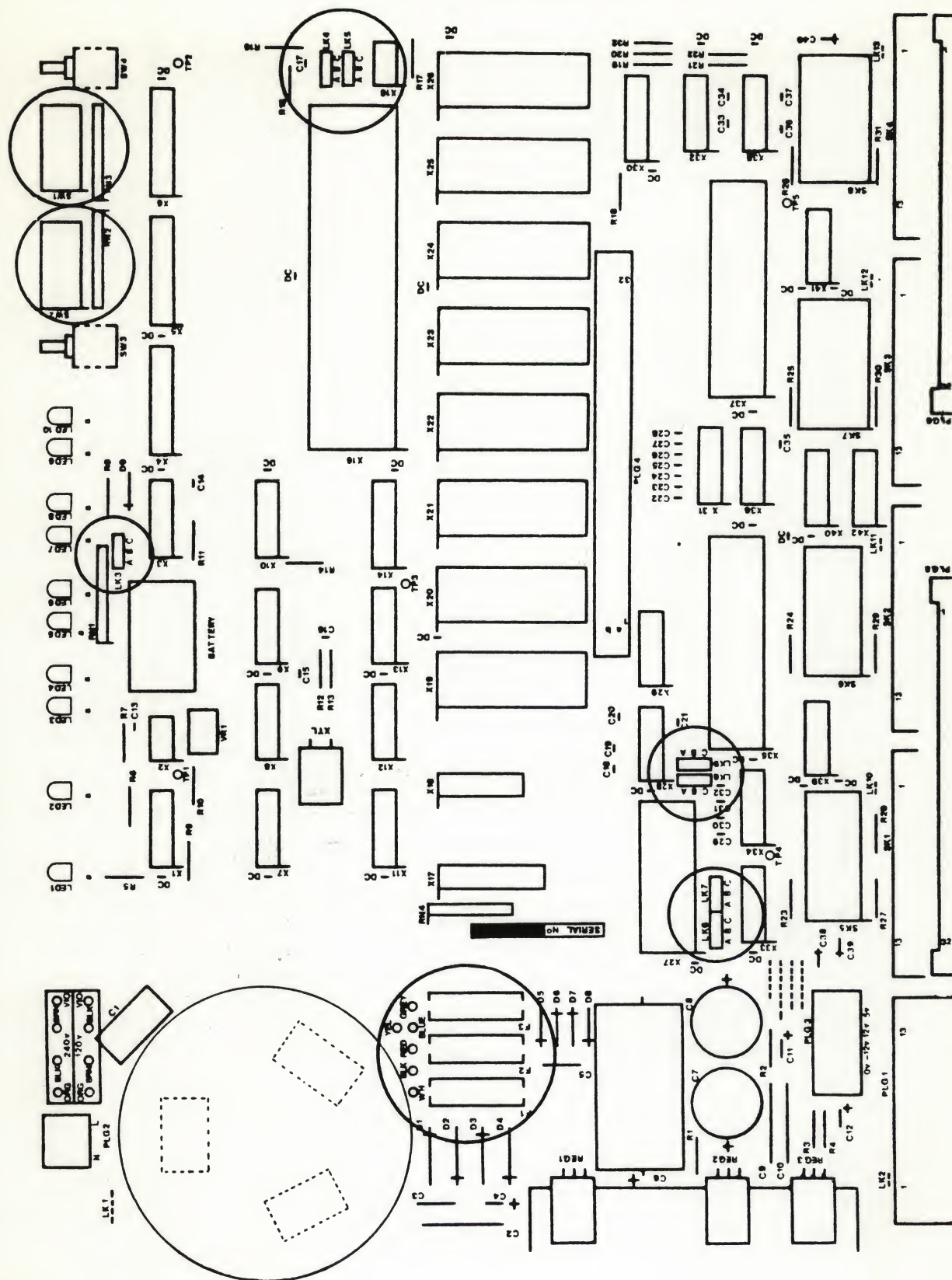
Transparent and Simple Profile PAD Parameter Settings

Parameter reference number (see Note 3)	Parameter description	Parameter setting for CCITT standard profiles	
		Transparent standard profile	Simple standard profile
1	PAD recall using a character	Set to not possible (value 0)	Set to possible (value 1)
2	Echo	Set to no echo (value 0)	Set to echo (value 1)
3	Selection of data forwarding signal	Set to no data forwarding signal (value 0)	Set to all characters in columns 0 and 1 and character (DEL) of International Alphabet No. 5 (value 126)
4	Selection of idle timer delay	Set to one second (value 20)	Set to no time out (value 0)
5	Ancillary device control	Set to no use of X-ON and X-OFF (value 0)	Set to use of X-ON and X-OFF (value 1)
6	Control of PAD service signals	Set to no service signals sent to the start-stop mode DTE (value 0)	Set to service signals are sent (value 1)
7	Selection of operation of PAD on receipt of break signal from the start — stop mode DTE	Set to reset (value 2)	Set to reset (value 2)
8	Discard output	Set to normal data delivery (value 0)	Set to normal data delivery (value 0)
9	Padding after carriage return (CR)	Set to no padding after CR (value 0) (see note 1)	Set to not padding after CR (value 0) (see note 1)
10	Line folding	Set to no line folding (value 0)	Set to no line folding (value 0)
11 (Read only)	Binary speed of start — stop mode DTE	Indicate speed of DTE	Indicate speed of DTE
12	Flow control of the PAD by the start-stop	Set to no use of X-ON and X-OFF (value 0)	Set to use of X-ON and X-OFF (value 1)
13	Line feed insertion after carriage return	Set to no line feed insertion (value 0)	Set to no line feed insertion (value 0)
14	Line feed padding	Set to no padding after LF (value 0)	Set to no padding after LF (value 0)
15	Editing	Set to no editing in data transfer state (value 0)	Set to no editing in data transfer state (value 0)
16	Character delete	Set to character 7/15 (DEL) (value 127)	Set to character (DEL) (value 127)
17	Line delete	Set to character 1/8 (CAN) (value 24)	Set to character (CAN) (value 24)
18	Line display	Set to character 1/2 (DC2) (value 18)	Set to character (DC2) (value 18)
19 (see note 2)	Editing PAD service signals	Set to editing PAD service signals for printing terminals (value 1)	Set to editing PAD service signal for printing terminals (value 1)
20 (see note 3)	Echo mask	Set to echo all characters (value 0)	Set to echo characters (value 0)
21	Parity Treatment	Set to no parity detection or generation (value 0)	Set to no parity detection or generation (value 0)

Note 1 — There will be no padding except that PAD service signals will obtain a number of padding characters according to the data transmission rate of the start-stop mode DTE.

Note 2 — Editing functions apply during the PAD command state irrespective of the value of parameter 15. The default values of selectable values of parameters 16, 17, 18 and 19 apply for these functions.

Note 3 — This parameter does not apply if parameter 2 is set to 0.



DPD 8 Link Location Chart

X.3 (PORT) PARAMETERS

DPD 8 supports all X.3 parameters described in the following tables. The defaults for these parameters can be determined by SW2 or by profiles specified via the configuration port. The user, or the destination computer, can change via X29 packets many of these for the duration of the session.

pp4

(pp1) - waffle
Nigel

Parameter reference number	Parameter description	PAD parameter value	PAD parameter meaning	Remarks
1 1	PAD recall using a character (E)	0 D-1 S	Not possible Character DLE	
2 1	Echo (E)	0 S D 1 S	No echo Echo	
3 126	Selection of data forwarding character(s) (E)	0 2 126 D ↑	No data forwarding character(s) Character CR All characters in column 0 and 1 and character DEL	Value formed by combination (2+4+8+16+32+64)
4 0	Selection of idle timer delay (E)	0-255 S=1 D=0	Value of idle timer in twentieths of a second	
5 1	Ancillary device control (E)	0 1 2 S	No use of X-ON (DC1) and X-OFF (DC3) Use of X-ON and X-OFF (data transfer) Use of X-ON and X-OFF (data transfer & command)	
6 -5	Control of PAD service signals (E)	0 1 5 S	No PAD service signals are transmitted to the start-stop mode DTE PAD service signals are transmitted in the standard format PAD service signals and the prompt PAD service signal are transmitted in the standard format	Value formed by combination (1+4)

Parameter reference number	Parameter description	PAD parameter value	PAD parameter meaning	Remarks
7 21	Selection of operation of the PAD on receipt of break signal from the start-stop mode DTE (E)	0 2 8 D 21 S	Nothing Reset Escape from data transfer state Discard output, interrupt and indication of break	Value formed by combination (1+4+16)
8 0	Discard output (E)	0 S 1	Normal data delivery Discard output	
9 0	Padding after carriage return (CR) (E)	0 S 1 to 7	No padding after CR Number of padding characters inserted after CR	
10 0	Line folding (E)	0 S 1 to 255	No line folding Number of graphic characters per line	
11 (read only) X (13)	Binary speed of start-stop mode DTE (E)	2 3 4 12 13 14 15 N 13 S	300 bit/s 1200 bit/s 600 bit/s 2400 bit/s 4800 bit/s 9600 bit/s 19200 bit/s	The values implemented in individual PADs depend on the range of DTE data transmission rates which are supported. The allocation of decimal values to all known rates is to avoid revision of the Recommendation in the future
12 1	Flow control of the PAD (E)	0 1 S N 1 S	No use of X-ON (DC1) and X-OFF (DC3) for flow control Use of X-ON (DC1) and X-OFF (DC3) for flow control	

12, 0 → 12, 1
5, 1 → 5, 2

Parameter reference number	Parameter description	PAD parameter value	PAD parameter meaning	Remarks
13	Linefeed insertion after carriage return (A)	N 0 S 1 4 5 6 7	No linefeed insertion Insert linefeed after transmission of CR to the start-stop mode DTE Insert linefeed after echo of CR to the start-stop mode DTE Insert linefeed after transmission to the start-stop mode DTE and after echo of CR Insert linefeed in data stream after CR from the start-stop mode DTE and after echo of a CR to the start-stop mode DTE Insert linefeed in the data stream to and from the start-stop mode DTE and after echo of a CR to the start-stop mode DTE	 Combination (1+4) Combination (2+4) Combination (1+2+4) Note – Applies only to data transfer state
14	Padding after linefeed (A)	N 0 S 1 to 7	No padding after linefeed Number of padding characters inserted after linefeed	Note – Applies only to data transfer state
15 (see Note 1)	Editing (A)	N 0 S 1	No use of editing in the data transfer state Use of editing in the data transfer state	
16 (see Note 1)	Character delete (A)	0 to 126 N 127 S	One character from IA5 Character 7/15 (DEL)	

Parameter reference number	Parameter description	PAD parameter value	PAD parameter meaning	Remarks
17 (see Note 1)	Line delete (A)	0 to 23 24 25 to 127	One character from range IA5 Character 1/8 (CAN) One character from range IA5	
18 (see Note 1)	Line display (A)	0 to 17 18 19 to 127	One character from IA5 Character 1/2 (DC2) One character from IA5	
19 (see Note 1)	Editing PAD service signals (A)	0 1 2	No editing PAD service signals Editing PAD service signals for printing terminals Editing PAD service signals for display terminals	
20 (see Notes 2 and 3)	Echo mask (A)	0 1 2 4 8 16 32 64 128	No echo mask (all characters echoed) No echo of CR No echo of LF No echo of VT, HT, FF No echo of BEL, BS No echo of ESC, ENQ No echo of ACK, NAK, STX, SOH, EOT, ETB, ETX No echo of editing characters as designated by parameters 16, 17, 18 No echo of all other characters in columns 0 to 1 not mentioned above and DEL	Values may be formed by combination of basis values

?

Parameter reference number	Parameter description	PAD parameter value	PAD parameter meaning	Remarks
21	Parity treatment (A)	0 S 1 X 2	No parity checking or generation Parity generation	

Note 1 — When parameter 15 is implemented, the values of parameters 16, 17, 18 and 19 are either default values or are selectable from the optional range shown. The editing function is provided during the PAD command state whether parameter 15 is implemented or not. If parameters 16, 17, 18 and 19 are implemented, the editing characters and editing PAD service signals during the PAD command state are defined by the appropriate values of these parameters. If parameters 16, 17, 18 and 19 are not implemented, the default values for the functions of these parameters are applicable to the pad command state.

Note 2 — This parameter does not apply if parameter 2 is set to zero.

Note 3 — If parameter 5 or 12 is set to a nonzero value, then the X-ON and X-OFF characters are not echoed.

INSTALLATION

To reach the main board in the metal case, unplug the unit and disconnect all cables from the connectors. Then remove the four screws in the underside of the box and slide the lid towards the rear connectors until free.

Step 1. Trunk Configuration

The unit is supplied from the factory with trunk clocks expected from the modem. Using links LK6, 7, 8 and 9 the DPD 8 can be configured to supply clocks (refer to Appendix A). The actual trunk speed is set up from the configuration port, but defaults to 19200 baud after a cold start.

The pin connections for the trunk connector PLG1 are defined in Appendix E.

The only other parameter that must be set, is the X.25 level II address 01 or 03. The link address is defined by SW1 switch 3, OFF for DTE addressing, ON for DCE addressing. Refer to Appendix A for more details.

Step 2. Programming Plugs

The asynchronous ports can be configured physically as a DTE or DCE connection. The factory default headers are DCE for direct connection to a terminal. Refer to Appendix E for details of the options available. The programming plugs fit in sockets SK1 thru SK8. Refer to Appendix A for their Location. The programming plugs must be oriented correctly when inserted. For special configurations a blank header plug can be supplied and wired according to the particular application.

Step 3. Default Port Options

For the first time configuration, it is suggested that the ports be configured for auto baud/parity detect and either the X.3 default simple or transparent profile. These defaults are set up on SW2. Refer to Appendix A for details.

Step 4. Disable Battery

If the factory supplied autobaud and autoparity options are not suitable, the battery RAM must be disabled in order for the default switches SW2 to be read. This is done by moving link LK3 from AB to BC momentarily, then BC to AB. Subsequent power on will perform a cold start and set the whole PAD to defaults.

Step 5. Connect Terminal

Plug a terminal to one of the asynchronous ports, power up the unit and the terminal. If in auto baud/parity detect, depress the (CR) key a number of times. The user, after auto detection has taken place, should then receive the logon banner.

**DYNATECH COMMUNICATIONS
SOFTWARE VERSION 1.00A
TYPE "HELP" FOR HELP
PORT X**

Where X is the number of the port to which the terminal is connected.

If the baud/parity had been previously set up, a single (CR) key should logon the terminal.

If you do not receive this information, check SW2 settings, check the cable, check terminal settings or try another terminal.

Once logged on, the user can access the configuration port or display status as required. Refer to Appendix D for the commands available.

To log into the configuration port, type;

CONFIG (CR)

the user will be prompted for a password, enter the default password;

DYN68.25 (CR) (R1092)

after which the user will be prompted via menus to all the configuration options. Refer to Appendix F.

Step 6. Trunk Connection

Once the PAD has been configured for the various link level configuration options T1 timer, window size etc., the trunk can be connected to PLG1. The TRUNK lamp will light when data transfer state is active. Failure of the lamp to light will probably be due to either trunk clocks, or the wrong link address via SW1 has been selected. Check these parameters and retry.

Step 7. Final Checkout

The final configuration of the DPD 8 can be checked out by displaying the status menu's PORT, SYSTEM and TRUNK from any port or remotely using the DISP or CONFIG commands. If all is correct, the unit can be re-assembled and is ready for operation. All configuration information is stored in battery backed RAM and is protected during mains power down.

TERMINAL USER'S INTERFACE

D.1. PAD Command Signals and PAD Service Signals

The operation of the PAD depends on the current values of internal PAD variables which are known as PAD parameters. Initially PAD parameter values depend on the initial standard profile, set from a cold start of the PAD. Two profiles, simple and transparent are selected from DIL switch settings. The parameter values for the transparent and simple standard profile are given in table D.3.

The following PAD commands (direction DTE to PAD) are provided for:

- (a) The establishment and clearing of a virtual call.
- (b) The selection of a set of preset values of PAD parameters known as a standard profile, either CCITT or network defined.
- (c) The selection of individual PAD parameter values.
- (d) Requesting the current values of PAD parameters to be transmitted by the PAD to the DTE.
- (e) Sending of an interrupt.
- (f) Requesting the status of the circuit.
- (g) Resetting the virtual call.
- (h) Display various internal states.
- (i) Entering configuration.
- (j) Requesting HELP information.

The following PAD service signals (direction PAD to DTE) are provided.

- (a) Transmit call progress signals to the calling DTE.
- (b) Acknowledge PAD command signals.
- (c) Transmit information regarding the operation of the PAD to the start-stop mode DTE.
- (d) Outputting help information.

The formats of PAD command signals and the standard formats of PAD service signals are given in table D.1.

PAD command signal format	Function	PAD service signal sent in response (See note)
STAT	To request status information regarding a virtual call connected to the DTE	FREE or ENGAGED
CLR	To clear down a virtual call	CLR CONF or CLR ERR (in the case of local procedure error)
PAR? List of parameter references	To request the current values of specified parameters	PAR (list of parameter references with their current values or INV)
SET? List of parameter references and corresponding values	To request changing or setting of the current values of the specified parameters	PAR (list of parameters references with their current values or INV)
PROF (identifier)	To give to PAD parameters a standard set of values	Acknowledgement
RESET	To reset the virtual call	Acknowledgement
INT	To transmit an interrupt packet	Acknowledgement
SET List of parameters with requested values	To set or change parameter values	Acknowledgement or PAR (listing of invalid parameter reference followed by INV)
Selection PAD command signal	To set up a virtual call	Acknowledgement
DISP	To request internal PAD status	Menu options for TRUNK status. SYSTEM status, PORT status and MNEMONIC ADDRESS tables
CONFIG	To allow entry to the configuration port	Menu driven prompts of all configuration parameters
HELP	User HELP facility	HELP text
SET	To set parameters to their defaults	Acknowledgement

Table D.1. PAD Command Signals

D.2. Formats of PAD Command Signals and PAD Service Signals

All characters in columns 2 to 7 of International Alphabet No. 5, excluding the characters SP (DEL), (+) and the characters assigned to perform editing functions will be recognised by the PAD as forming part of a PAD command signal. The PAD will always recognize the characters (CR) and (+) as the PAD command signal delimiter. The PAD command signal delimiter is not part of the command. Characters (SP) and (DEL) are not considered as part of a PAD command signal and will be ignored by the PAD if no other function is assigned to these characters. Characters from columns 0 to 7 may be assigned to perform editing functions as defined by the PAD editing parameters. Unassigned characters in columns 0 and 1 will be ignored by the PAD.

PAD commands can be entered in upper or lower case and are converted internally to upper case characters.

All PAD commands must be terminated with the PAD command signal delimiter, CR or +.

D.3. Validity of Commands

The use of the terminal user commands are restricted to certain call connection states. If a call is active the user can escape from data transfer state, using an escape sequence in order to issue a command whereas commands can be issued directly if no call is active. The following table D.2 defines the validity of commands dependent on call state.

PAD command signals	Valid before virtual call set-up	Valid after escaping from data transfer state	Valid after escaping from connection-in progress state
Selection (call set up)	X		
Profile selection	X	X	
Set	X	X	
Set and read	X	X	
Read	X	X	
Clear request		X	X
Status	X	X	
Reset		X	
Interrupt		X	
Display	X	X	X
Config	X		
Help	X	X	X

Table D.2. PAD Command Validity Table

Failure to observe the validity of a command will result in a PAD service message ERR.

All PAD service signals are presented in upper case and followed by a format effector CR LF.

It should be noted that unless parameter 6 is set to 5 no user prompt character will appear on the DTE terminal.

D.4. Read PAD Command

The format of the Read PAD command is;

PAR?x,x,x

Where x is a decimal reference to the parameter to be read. If no parameter number is indicated then all parameters will be read.

If more than one parameter is required the numbers must be separated by commas.

eg. PAR?1,3,5

In the case where a parameter number is requested but invalid the following typical response will be issued;

PAR?1,3,64

will result in

PAR 1:1, 3:126, 64:INV

D.5. Profile Selection

The format of the profile selection command is;

PROFx

Where x is a decimal digit 0 thru 8.

Profile 0 is a special case and sets up the simple or transparent profile as defined by the DIL switches, refer to table D.3 for the values of the parameters in either case.

Profiles 1 to 8 are user defined parameter values and are entered using the configuration port. These profiles can be assigned on a port by port basis.

D.6. Set PAD Command and the Set and Read Command

The format of the Set Command is;

SETx:y

Where x is a decimal reference of the parameter to be set and y is the parameter value required.

Table D.3 Transparent and Simple Profile PAD Parameter Settings

Parameter reference number (see Note 3)	Parameter description	Parameter setting for CCITT standard profiles	
		Transparent standard profile	Simple standard profile
1	PAD recall using a character	Set to not possible (value 0)	Set to possible (value 1)
2	Echo	Set to no echo (value 0)	Set to echo (value 1)
3	Selection of data forwarding signal	Set to no data forwarding signal (value 0)	Set to all characters in columns 0 and 1 and character (DEL) of International Alphabet No. 5 (value 126)
4	Selection of idle timer delay	Set to one second (value 20)	Set to no time out (value 0)
5	Ancillary device control	Set to no use of X-ON and X-OFF (value 0)	Set to use of X-ON and X-OFF (value 1)
6	Control of PAD service signals	Set to no service signals sent to the start-stop mode DTE (value 0)	Set to service signals are sent (value 1)
7	Selection of operation of PAD on receipt of break signal from the start — stop mode DTE	Set to reset (value 2)	Set to reset (value 2)
8	Discard output	Set to normal data delivery (value 0)	Set to normal data delivery (value 0)
9	Padding after carriage return (CR)	Set to no padding after CR (value 0) (see note 1)	Set to not padding after CR (value 0) (see note 1)
10	Line folding	Set to no line folding (value 0)	Set to no line folding (value 0)
11 (Read only)	Binary speed of start — stop mode DTE	Indicate speed of DTE	Indicate speed of DTE
12	Flow control of the PAD by the start-stop mode DTE	Set to no use of X-ON and X-OFF (value 0)	Set to use of X-ON and X-OFF (value 1)
13	Line feed insertion after carriage return	Set to no line feed insertion (value 0)	Set to no line feed insertion (value 0)
14	Line feed padding	Set to no padding after LF (value 0)	Set to no padding after LF (value 0)
15	Editing	Set to no editing in data transfer state (value 0)	Set to no editing in data transfer state (value 0)
16	Character delete	Set to character 7/15 (DEL) (value 127)	Set to character (DEL) (value 127)
17	Line delete	Set to character 1/8 (CAN) (value 24)	Set to character (CAN) (value 24)
18	Line display	Set to character 1/2 (DC2) (value 18)	Set to character (DC2) (value 18)
19 (see note 2)	Editing PAD service signals	Set to editing PAD service signals for printing terminals (value 1)	Set to editing PAD service signals for printing terminals (value 1)
20 (see note 3)	Echo mask	Set to echo all characters (value 0)	Set to echo all characters (value 0)
21	Parity Treatment	Set to no parity detection or generation (value 0)	Set to no parity detection or generation (value 0)

Note 1 — There will be no padding except that PAD service signals will obtain a number of padding characters according to the data transmission rate of the start-stop mode DTE.

Note 2 — Editing functions apply during the PAD command state irrespective of the value of parameter 15. The default values of selectable values of parameters 16, 17, 18 and 19 apply for these functions.

Note 3 — This parameter does not apply if parameter 2 is set to 0.

The format of the Set and Read command is;

SET? x:y

Where x and y have the same definitions as above.

If more than one parameter is required to be set/read a comma must be used between fields.

eg. SET 2:0,3:2,9:4

D.7. Reset PAD Command

The format of the Reset command is;

RESET

This command forces an X.25 level III reset to be transmitted on the virtual circuit associated with this terminal or port.

On receipt of a level III reset command, one of the following service messages will be generated.

RESET DTE	or	POSSIBLE DATA LOSS
RESET ERR		RESET, LOCAL PROC ERR
RESET NC		POSSIBLE DATA LOSS NC

depending on whether or not the expanded response option is enabled.

D.8. Clear Request PAD Command

The format of the Clear Request PAD command is;

CLR

This command will initiate a virtual circuit clear request to the network.

On receipt of a clear confirmation after a clear request, the following service message will be generated,

CLR CONF

or if expanded messages are enabled,

DISCONNECTED

In the case where a clear request is received from the trunk, one of the following service messages will be generated.

CLR OCC	or	BUSY
CLR NC		NETWORK CONVERSION
CLR INV		INV CALL
CLR NA		ACCESS BARRED
→ CLR ERR		LOC PROC ERR
CLR RPE		REM PROC ERR
CLR NP		ILLEGAL ADDRESS

CLR DER	OUT OF ORDER
CLR PAD	CLR PAD
CLR DTE	DISCONNECTED
CLR RNA	REFUSED COLLECT CALL

depending on whether or not the expanded response is enabled.

If no clear cause is available, or the cause is not recognised, the service message will simply be;

CLR or DISCONNECT ERROR

In the case where the trunk restarting causes calls to be cleared, the following service message is generated.

CLR RESTART

In the case where a call request from the pad is not responded to within the timeout period, the following message is generated:

CLR TIMEOUT

D.9. Status PAD Command

The format of the Status PAD command is;

STAT

This command requests the status of this port with reference to a call being active or not.

The two possible responses to this command are;

ENGAGED where the port is engaged, or

FREE when the port is available.

D.10. Interrupt PAD Command

The format of the Interrupt command is;

INT

This command forces an X.25 level III Interrupt Request to be transmitted on the virtual circuit associated with this terminal or port.

D.11. Call Request PAD Command

The basic Call Request PAD command has the following format;

FBLOCK,ABLOCK,UDFIELD

Where;

FBLOCK is the facility request block.

ABLOCK is the calling Network User Address.

UDFIELD is the Used Data Field required.

D.11.1 FBLOCK Definitions

The FBLOCK or facilities block defines the call request facilities which are requested for this call request, this field is not mandatory. The following facilities can be requested.

D.11.2 NUI Facility Request

The format for this facility request is;

N str

Where str is any number of characters up to 19 from columns 2 to 7 of international alphabet No. 5, with the exceptions of (SP), (DEL), (–) and (+) characters.

D.11.3 Reverse Charge Facility

The format for the Reverse Charge facility request is;

R

This will request charge for the call to be reversed to the called network address.

D.11.4 Packet Window Request Facility

The format of the Packet Window Request facility is;

Wx

Where x is a decimal digit between 1-7 and requests the window negotiation facility.

D.11.5 Closed User Group Request Facility

The format of the Closed User Group request facility is;

Gx or Gxx

Where x,xx is a decimal digit defining the Closed User Group number required.

D.11.6 ABLOCK Definition

The ABLOCK or address block is the called Network User Address (NUA) of the particular connection that is requested, the address digits are decimal digits 0-9 and from one to fifteen digits long.

eg. 31107030033100

D.11.7 UDFIELD Definition

The UDFIELD or User Data Field block is a maximum 16 character string of which is defined the first four characters "01000000" will be inserted automatically and the remaining 12 characters can be defined, by the user, as any character from columns 2-7 of the international alphabet No. 5 with the exceptions of (SP), (DEL), (-) and (+). The characters are introduced by "D".

Typical examples of a Call Request command are given below;

(1) R,W5,G01-31107030033100 D USER ONE.

(2) 2342707122172.

(3) 234817424413701 D USER TWO.

(4) R,W5-311940342613014.

The basic form of this command need only be the ABLOCK, if the FBLOCK field is required, each facility must be separated by a comma and between the FBLOCK and ABLOCK a field separator (-) must be inserted.

D.11.8 Extended Call Request Commands

In addition to the standard X.28 call request command, two additional call request commands are available;

(a) Auto call request.

(b) Mnemonic call request.

D.11.8.1 Auto Call PAD Request

The format of the auto call PAD request is;

CALL

This command issues an automatic call request using the remote address and any facilities required, having being previously configured into the PAD. Refer to section 2.4.1.9 to give details of how to pre-program these parameters. See also auto call set-up using (CR) or DTR signals reference Appendix E.

D.11.8.2 Mnemonic Call Request

The format of the mnemonic call PAD request is;

CALL mnemonic

Where mnemonic is a character string referencing a table entry in the mnemonic address tables.

This command is similar to the auto call command in that a list of up to 40 remote addresses and associated facilities can be pre-programmed into

the PAD via the configuration port each associated with a short mnemonic for simple referral. Refer to section 2.4.2.6 to give details of how to pre-program these parameters.

The following service message is generated on successful connection of a call following any of the call request commands.

COM

In the case of an incoming call request then the service message generated is;

<calling DTE address> COM <call user data field>

eg. 2342707122172 COM DYNATECH

D.11.8.3 Display PAD Request

The format of the display PAD request is;

DISP

On entering this command the user is prompted via a menu to request display of the trunk status, asynchronous port status system status or the mnemonic address tables.

D.11.8.4 Display Command Main Menu

```
*****
*
*   DYNATECH COMMUNICATIONS LTD : DPD 8   *
*
*   SOFTWARE VERSION 1.00A COPYRIGHT 1986  *
*
*****
```

MAIN MENU

PORT STATUS(P1-P4) SYSTEM STATUS (S) TRUNK STATUS(T)
MNEMONIC TABLE.....(M) QUIT.....(Q)

ENTER SELECTION:

Typical output formats for each option are given in the following pages.

D.11.8.5 Port Status Display

PORT STATUS : PORT 1

IDLE LCN=0 STATE=0 RTS=U DTR=U BAUD=AUTO PTY=AUTO CHAR= 7BIT
AUTO= ADDR= UDATA=
NUI= AWIND=0 AREV=N CUG=
INV-CLR=N R-CHG=REF HUNT=Y MORE=N WDW=2/2 PROF=0
PR=0 PS=0 RC=00 CC=00

ACT X3

1:1 2:1 3:126 4:0 5:1 6:1 7:2 8:0 9:0 10:0 11:14
12:1 13:0 14:0 15:0 16:127 17:24 18:18 19:1 20:0 21:0

DFT X3

1:1 2:1 3:126 4:0 5:1 6:1 7:2 8:0 9:0 10:0 11:0
12:1 13:0 14:0 15:0 16:127 17:24 18:18 19:1 20:0 21:0

PORT STATUS(P1-P4) SYSTEM STATUS.... (S) TRUNK STATUS(T)
MNEMONIC TABLE.....(M) QUIT.....(Q)

ENTER SELECTION:

EXPLANATION

RTS	— “U” if RTS is active, “D” if not.
DTR	— “U” if DTR is active, “D” if not.
BAUD	— The baud rate in bits per second or “AUTO” if auto detect.
PTY	— The parity setting: “AUTO”, “ODD”, “EVEN”, “MARK”, “SPACE” or “TRANS”.
CHAR	— “7 BIT” for all parity settings except “TRANS” which will be “8 BIT”.
IDLE/ACTIVE	— “ACTIVE” if the port has a call up or is in the process of establishing or clearing one, otherwise “IDLE”.
LCN	— The logical channel and group of the current call or the last one to be cleared.
STATE	— The state of the finite state machine controlling the packet level process. The state are; 0—No calls active or in progress. 4—Waiting for a call accept from the network. 5—An incoming call is waiting for an active port. 6—Data transfer. 7—A reset has been sent and a confirmation is awaited.

- 8—An RNR has been received preventing further transmission.
- 9—Waiting for the X.28 process to handle an incoming clear.
- 10—Waiting for the network to confirm an outgoing clear.

AUTO	— If autocall has been configured this field will indicate "DTR" for autocall on DTR or "CR" for autocall on carriage return.
ADDR	— The autocall address (if configured).
UDATA	— The autocall user data field.
NUI	— The autocall nui facility.
AWIND	— The autocall packet window request facility.
AREV	— The autocall reverse charge facility. "Y" = enabled, "N" = disabled.
CUG	— The autocall closed user group facility.
INV-CLR	— "Y" if invitation to clear enabled, "N" if disabled.
R-CHG	— "ACCPT" if incoming reverse charge calls accepted, "REF" if not.
HUNT	— "Y" if the port is in the hunting group. "N" if not.
MORE	— "Y" if the more bit feature on outbound data is enabled, "N" if not.
WDW	— The packet level windows for the current call. The first digit is for outbound data, the second for inbound.
PROF	— The number of the initial profile for the port.
PR/PS	— The receive and send packet sequence numbers.
RS	— The cause field of the last incoming reset message.
CC	— The cause field of the last incoming clear message.
ACT X3	— The current X3 parameters.
DEF X3	— The default X3 parameters.

D.11.8.6 System Status Display

SYSTEM STATUS

SOFTWARE VERSION 1.00A BUFFERS=62 ADDR= HILCN=4 LOLCN=1
CONNECT=DYNATECH DPD 8~~ SOFTWARE VERSION 1.00A~~ TYPE
"HELP" FOR HELP~~.
EXPAND X28=N PKT SIZE=128 PKT WINDOW=2 SWITCH 1=07
SWITCH 2=40
TRUNK STATE=U DATAPAC OPTION=N PORTS=4 ACTIVE PORTS=0

PORT STATUS.....(P1-P4) SYSTEM STATUS.....(S) TRUNK STATUS.....(T)
MNEMONIC TABLE(M) QUIT.....(Q)

ENTER SELECTION:

EXPLANATION

BUFFERS	—	The number of unused 256 byte buffers.
ADDR	—	The local address (i.e. the address of the pad) if configured, otherwise empty.
HILCN/LOLCN	—	The range of logical group and channel numbers usable for outgoing calls.
CONNECT	—	The configuration logon banner.
EXPAND X28	—	"N" if pad service signals are output in X28 format. "Y" if they are output in a more readable non-standard format.
PKT SIZE	—	Either "128" or "256" dependant on the configured packet size.
PKT WINDOW	—	The default size of the packet window.
SWITCH 1/2	—	The settings of the front panel dual in line switches. Each switch setting is given as a two digit hexadecimal number with position 1 represented by '1' and position 8 represented by '80'. Each switch position registers as a 1 when it is down (on) and a 0 when it is up (off). Position 8 on switch 2 is not used and will always register as a 0.
TRUNK STATE	—	"U" if the trunk is up, "D" if it is down.
DATAPAC OPTION	—	"Y" if the option is on, "N" if not.

- | | |
|-----------------|--|
| PORTS | — The number of ports on the pad, either logged on or not. |
| ACTIVE
PORTS | — The number of active ports on the pad. An active port is one with a call present or in the process of being cleared. |

D.11.8.7 Trunk Status Display

TRUNK STATUS

DTE DCD=D LINK STATE=14 O/P BAUD=19.2k T1=30 N2=20
 LINK WINDOW=7 K=0 VS=0 VR=2
 REJ TX=0 REJ RX=0 FRMR TX=1 FRMR RX=2
 FCS=0

PORT STATUS.....(P1-P4) SYSTEM STATUS....(S) TRUNK STATUS.....(T)
 MNEMONIC TABLE(M) QUIT(Q)

ENTER SELECTION:

EXPLANATION

- | | |
|------------------------|---|
| DTE/DCE | — Pad is emulating either a dte or a dce. |
| DCD | — “U” if dcd input is active, otherwise “D”. |
| LINK STATE | — The state of the finite state machine controlling the link level process. The states are:

3—A DISC has been sent.
5—An SABM has been sent.
6—An FRMR has been sent.
7—An REJ has been sent.
9—An RNR has been received.
11—An RNR has been received and an REJ has been sent.
13—Timer recovery.
14—Information transfer. |
| { O/P BAUD
T1
N2 | — The data rate provided if the pad is generating clocks.

— The value of the T1 timer in tenths of a second.

— The value of the N2 (retry) counter. |

LINK WINDOW	—	The configured value of the link window.
K	—	The number of unacknowledged i-frames.
VS/VR	—	The send and receive sequence numbers.
REJ TX/RX	—	Counts of transmitted and received reject frames.
FRMR TX/RX	—	Counts of transmitted and received frame reject frames.
FCS	—	Count of the number of frames received with FCS (CRC) errors.

D.11.8.8 Mnemonic Address Table

MNM ADDR	USER DATA	NUI STRING	W	R	CUG
CPU1 12345678909876	JAMES	ABCD1234	4	Y	01
CPU2 54545465363547	PAULINE	7231XZXC	2	N	
TTY3 34353768754636			0	N	

PRESS ANY KEY TO EXIT:

D.12 Help PAD Command

The format of the Help PAD command is;

HELP or HWELPtopic

Help is available on the following topics:

recall, echo, echomask, forwarding, timer, xon, xoff, break, output, prompt, signals, padding, linefeed, edit, parity, folding, commands, calls, syntax.

Type "help topic" to get help topic.

Topic may be abbreviated to 5 or more characters.

D.13. Config PAD Request Command

The format of the config PAD request is;

CONFIG

Entering the command allows mutually exclusive access to the PAD configuration port. The user is prompted for an access password, which can be altered at any time within the configuration port, and defaults to DYN68.25 after a cold start. On successful entry of the password, the user is prompted via a series of menus as follows.

DPD 8 : CONFIGURATION MENU

```
*****
*
*   DYNATECH COMMUNICATIONS LTD : DPD 8   *
*
*   SOFTWARE VERSION 1.00A COPYRIGHT 1986 *
*
*****
```

MAIN MENU

```
PORT CONFIGURATION .....(P1-P4)   SYSTEM CONFIGURATION.....(S)
TRUNK CONFIGURATION.....(T)        QUIT CONFIGURATION.....(Q)
```

ENTER SELECTION:

The following sub-menus display the format and options available to the user.

D.13.1 PORT Configuration

DPD 8 : CONFIGURATION MENU

PORT 2 CONFIGURATION

MAIN MENU	(M)	PORT 2 STATUS	(PS)
SET BAUD	(B)	SET PARITY	(P)
PORT PROFILE	(PP1-PP8)	CONFIGURE AUTOCALL	(A)
INVITATION TO CLEAR	(I)	REVERSE CHARGE	(R)
HUNT GROUP	(H)	MORE BIT SUPPORT	(MB)
SET FORMAT STRING	(SF)	INITIALISE PORT	(IP)
CHANGE PORT	(P1-P4)	QUIT CONFIGURATION	(Q)

ENTER SELECTION:

D.13.2 SYSTEM Configuration

DPD 8 : CONFIGURATION MENU

SYSTEM CONFIGURATION

MAIN MENU	(M)	SYSTEM STATUS	(SS)
SET PACKET WINDOW	(W)	SET PACKET SIZE	(P)
SET LCN	(L)	CONFIGURE MNEMONICS ...	(MN)
NETWORK SUPPORT	(W)	SET LOGON BANNER	(B)
SET LOCAL ADDRESS	(A)	CHANGE PASSWORD	(PW)
EXPANDED MESSAGES	(E)	CLR/CLR-CONF OPTIONS	(C)
RESET PAD	(R)	QUIT CONFIGURATION	(Q)

ENTER SELECTION:

D.13.3 TRUNK Configuration

DPD 8 : CONFIGURATION MENU

TRUNK CONFIGURATION

MAIN MENU	(M)	TRUNK STATUS	(TS)
SET LINK WINDOW	(W)	SET N2 RETRY COUNT	(N)
SET T1 TIMER	(T)	RESET TRUNK STATISTICS	(R)
SET BAUD (INTERNAL)	(B)	QUIT CONFIGURATION	(Q)

ENTER SELECTION:

The actual parameter definitions and ranges of all parameters are covered each in turn in Appendix E.

RS-232-C SIGNALS

X.25 Synchronous Interfaces (PLG 1)

RS-232-C Male Connector	PIN	NAME	FUNCTION	DIRECTION
	1	FG	Frame Ground	
	2	TD	Transmitted Data	from DPD 8
	3	RD	Receive Data	from modem
	4	RTS	Request to Send	from DPD 8
	5	CTS	Clear to Send	from modem
	7	SG	Signal Ground	
	8	DCD	Data Carrier Detect	from modem
	15	TC	Transmitter Clock	from modem
	17	RC	Receiver Clock	from modem
	20	DTR	Data Terminal Ready	from DPD 8

Note: The DPD 8 can be selected, via internal links, to provide modem clocks if required.

Port Interfaces (SKT 1-8)

DPD 8 can be configured with DTE or DCE port interfaces by the use of programming plugs. When configured as DCE, the interface behaves as a 113 or 212 type modem. When configured as a DTE, the interface behaves as a business machine for connection to a 113 or 212 type modem.

RS-232-C
Port - - -
Female
Connector

PIN NAME FUNCTION

-----TO or FROM PAD

If DCE If DTE

1	SG	Frame Ground		
2	TD	Transmitted data	to	from
3	RD	Received Data	from	to
4	RTS	Request to Send	*	from
5	CTS	Clear to Send	from	*
6	DSR	Data Set Ready	from	ignored
7	SG	Signal Ground		
8	DCD	Data Carrier Detect	from	to
20	DTR	Data Terminal Ready	to	from
22	RI	Ring Indicate	from	ignored
25	BSY	Make Busy	ignored	from**

*These signals are toward the PAD port when used. They are ignored when a standard DCE or DTE plug is used. Refer to the inbound flow control discussion on the next pages of this appendix for more information. The serial number of your unit may determine which plugs are installed. If the older DCE or DTE plugs are installed, the absence or presence of this signal may prevent the PAD from transferring data.

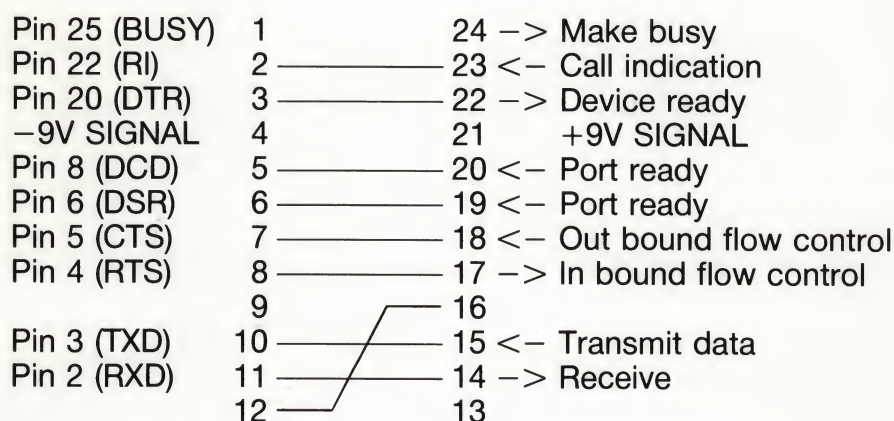
**Make Busy is held high when DTR and RTS are both low, this facility is not available at this time.

Programming Plug Configurations

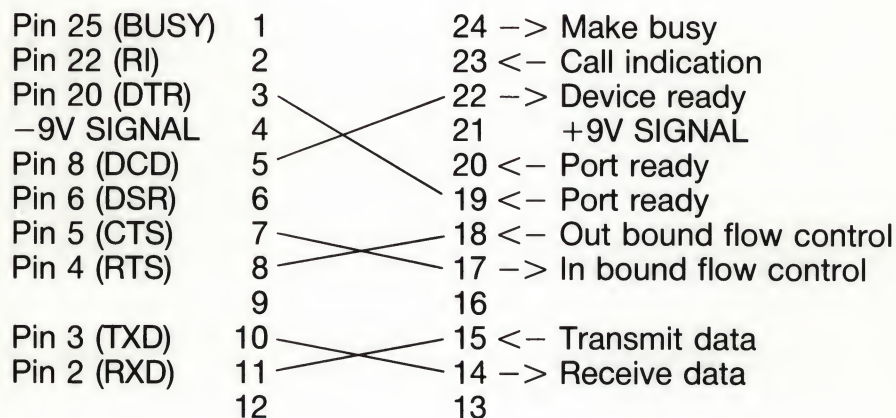
The programming plug determines on what RS-232-C pins the data set signals are presented. On the previous page, data set signals for the standard programming plugs were shown. Below, the configurations of those programming plugs are shown. Under certain circumstances you may require different configurations to remove the necessity to make special cables. USE 30 GAUGE WIRE FOR STRAPS when making or modifying these plugs.

Your unit may be equipped with encapsulated plugs. Red plugs are DCE, green are DTE. If you require special configuration, request blue plugs and wire from Dynatech or your distributor.

Red DCE Plug



Green DTE Plug

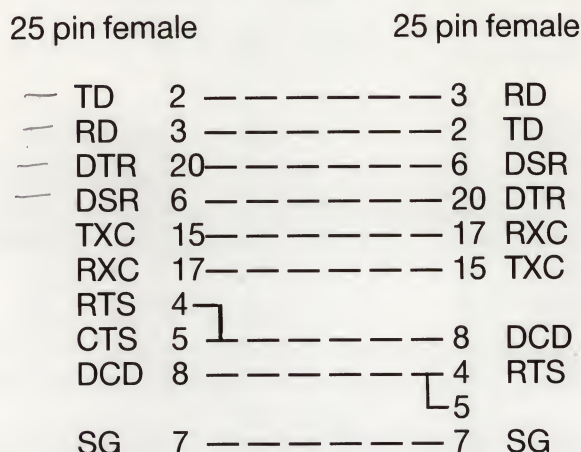


PROGRAMMING PLUGS MUST BE PROPERLY ORIENTED. Pin 1 must be toward the corner indicated by a white dot or the number 1 printed on the circuit board. Look for the white dot or the 1 for each plug.

Cable for Physical DCE Emulation

By a suitable setting of links 6-9, DPD will output clocks on pins 15 and 17 of the trunk port. By means of a suitable cable the signals on the interface may be modified so that DPD will simulate a physical dce enabling connection to another DPD or another item with a dte interface without need of a modem eliminator.

A suggestion for a suitable cable is shown below:



Note that in the case of two DPD 8s connected back to back, only one should have the links set to output clocks. Note too that the above cable is symmetric and may be connected either way round.

CONFIGURATION

DPD 8 is equipped with a software configuration port which can be reached from any port on the unit or across the trunk from a distant location. This configuration port behaves like any other switched virtual circuit service port, yet it is not a physical port. The PAD itself answers the call and converses with the user.

The configuration port is protected by a password, which can be changed via the configuration port whenever desired. Care should be taken so that you do not lock yourself out of the configuration port.

The configuration port serves two purposes. The first is to allow for the configuration and reconfiguration of the PAD and its ports. The second is to provide for inquiries as to the state of the PAD and its trunks and to examine and error statistics.

When the unit is first installed or when the battery and A.C. power fail simultaneously, all configuration information is destroyed and the unit reverts to the default settings. Whenever possible the default settings will be described in this section. The password used to access the configuration port defaults to "DYN68.25" until changed.

Connecting and Exchanging Data

The configuration port will accept any valid Call Request packet with a called address (number) ending in 9 (unless the DATAPAC network option is on, in which case the called address is ignored and the nine will be found in the last eight bits of the Call User Data field).

It is recommended that, prior to placing the call, X.3 parameter 15 (or the equivalent on a non-Dynapac PAD) be set to one to enable PAD editing. Then if you make an error typing you can use the Delete or Rubout key (or some other key defined by parameter 16) to correct your error prior to pressing Return.

FROM A PORT ON THE SAME UNIT type the command, CONFIG. Remember all commands must be followed by a carriage return.

CONFIG

FROM A PORT ON A DISTANT UNIT type the remote address assigned to the PAD followed by 9.

The user will then be prompted for a password which defaults to DYN68.25;

DYN68.25

This password can be changed at any time from the configuration port.

The following menu is then displayed;

DPD — : CONFIGURATION MENU

```
* * * * *
*   DYNATECH COMMUNICATIONS LTD : DPD 8   *
*                                           *
*   SOFTWARE VERSION 1.00A COPYRIGHT      *
*                                           *
*   DYNATECH COMMUNICATIONS 1986         *
* * * * *
```

MAIN MENU

PORT CONFIGURATION(P1-P4)	SYSTEM CONFIGURATION..... (S)
TRUNK CONFIGURATION.....(T)	QUIT CONFIGURATION.....(Q)

ENTER SELECTION >

The following sub-menus display the format and options available to the user.

F.1 PORT Configuration

DPD 8 : CONFIGURATION MENU

PORT 2 CONFIGURATION

MAIN MENU (M)	PORT 2 STATUS (PS)
→ SET BAUD (B)	→ SET PARITY (P)
→ PORT PROFILE (PP1-PP8)	CONFIGURE AUTOCALL (A)
INVITATION TO CLEAR (I)	→ REVERSE CHARGE (R)
→ HUNT GROUP (H)	MORE BIT SUPPORT (MB)
SET FORMAT STRING (SF)	INITIALISE PORT (IP)
CHANGE PORT (P1-P4)	QUIT CONFIGURATION (Q)

ENTER SELECTION:

F.2 SYSTEM Configuration

DPD 8 : CONFIGURATION MENU

SYSTEM CONFIGURATION

MAIN MENU	(M)	SYSTEM STATUS	(SS)
SET PACKET WINDOW	(W)	SET PACKET SIZE	(P)
SET LCN	(L)	CONFIGURE MNEMONICS ...	(MN)
NETWORK SUPPORT	(W)	SET LOGON BANNER	(B)
SET LOCAL ADDRESS	(A)	CHANGE PASSWORD	(PW)
EXPANDED MESSAGES	(E)	CLR/CLR-CONF OPTIONS	(C)
RESET PAD	(R)	QUIT CONFIGURATION	(Q)

ENTER SELECTION:

F.3 TRUNK Configuration

DPD 8 : CONFIGURATION MENU

TRUNK CONFIGURATION

MAIN MENU	(M)	TRUNK STATUS	(TS)
SET LINK WINDOW	(W)	SET N2 RETRY COUNT	(N)
→ SET T1 TIMER	(T)	RESET TRUNK STATISTICS	(R)
→ SET BAUD (INTERNAL)	(B)	QUIT CONFIGURATION	(Q)

ENTER SELECTION:

SPECIFICATION SUMMARY**Physical Level**

Interface: Synchronous RS-232 (V.24) (X.21 bis) male.
 Full duplex continuous carrier
 DPD supplies DTR and RTS
 Modem or DSU must supply DCD.

Transmission Rate: Up to 19200. Modem or DSU supplies clocks on pins 15 and 17. With internal links set appropriately and a special cable, DPD will supply clocks at 2400, 4800, 9600 and 19200.

Link Level

Framing: HDLC (As specified as in X.25).

Addressing: DTE or DCE set by switch.

Procedure: LAPB
 Protocol variations by switches.

Parameters: k — variable from 1 to 7
 N2 — variable from 3 to 20
 t1 — variable 0.1s to 10s. in increments of 0.1s.

Numbering: Modulo 8.

Packet Level

Services: SVC.

Numbering: Modulo 8.

Logical Group and Logical Channel: Will accept in the range 0-4095.
 Will call using an lgn/lcn in the range 1-4095, a subrange of which is set at configuration time.

Window: Pad wide variable default from 1 to 7.
 Will accept calls requesting any window.
 Will call using default window or one specified in selection pad command, autocall or mnemonic call.

Packet Size: Data portion of either 128 or 256 bytes. Will always fill packets if X.3 parameters set appropriately.

Facilities: Selection command can use reverse charge, window cug and nui as can autocall and mnemonic call.
 Incoming reverse charge calls can be selectively accepted or refused on a per port basis.

User Data Field: Can be set in selection, autocall or mnemonic call.

Local Address: Can be absent or set on a pad wide basis.
When building call request packets pad will append a two digit subaddress including the port number.

D — bit: Will accept, but never set.

M — bit: Will accept. Can set on a port by port basis.

Packet Assembler/Disassembler

X.28: To 1984, also command signal and service signal additions. X.28 service signals in standard form or an optional 'user friendly' form.

Interface: Asynchronous RS-232 (V.24) female. DTE or DCE emulation provided by a configurable wired header.

Transmission Rates: 300, 600, 1200, 2400, 4800, 9600, 19200, autobaud to any speed by typing several carriage returns.

Stop bits: One.

Character Set: ASCII.

Parity: Even, odd, mark, space or auto with seven bit data. None with eight bit data.

Hunting Group: One hunting group, ports may or may not be in group. An incoming call with subaddresses of '0' selects the hunting group.

X.29: To 1984, all messages except reselection pad are supported. Will always respond to invitation to clear with clear request. Can be set to generate invitation to clear rather than clear request on a port by port basis.

X.3: To 1984, all parameters except 22 (page wait) supported. All mandatory values and many optional values supported.

X.3 Profiles: Choice of CCITT standard or transparent profile by switch. CCITT profile or one of B user configurable profiles may be assigned to each port.

Flow Control: By X-ON and X-OFF to X.28 1984.

Incoming Call Indication: } By Ring Indicate.

Call Clearing: } By dropping DTR or by X.28 command.

Autocall:	Any port can call to its own address using its own facilities and user data field when the DTR signal appears or when the user types carriage return. As an alternative the command "call" with no parameters uses the autocall parameters.
Mnemonic Call:	Up to 40 mnemonics each with associated address, facilities and user data fields can be specified. The call is initiated by the "call" command with the mnemonic as a parameter.
Logon Banner:	128 character user configurable message output when terminal connects to pad.
Test Switch:	Front panel switch outputs Quick Brown Fox test message to all ports without disrupting any calls in progress.
Help Text:	The "help" command provides information on a variety of topics concerning pad operation and X.3 parameter settings.
Status Display:	The "disp" command provides information on the status of the ports, trunk and system as a whole. Menus simplify operation for the user.
Configuration:	The "config" command starts password protected configuration. Menus simplify the operation for the user. The whole configuration process can be done remotely by means of a call to subaddress '9'.

General

Dimensions:	332mm wide, 235mm deep, 67mm above surface.
Operating Temp:	5 to 35 degrees centigrade.
Storage Temp:	-10 to 70 degrees centigrade.
Power:	100 to 125 volts at 0.25 A. 200 to 250 volts at 0.125 A.